CONFIDENTIAL

25X1

Pressurized Balloon Research

January 21, 1957 (unsolicited)

25X1

25X1

Section I. Fiscal and Contractual Data.

A. Scope.

It is hereby proposed that [redacted] enter into a 25X1
contract with [redacted] for the purpose of 25X1
conducting theoretical and practical research in the field of pressurized balloon technology. The technical discussion of this proposal is outlined in Section II.

B. Terms and Conditions.

1. This proposal is subject to withdrawal by the contractor unless written acceptance thereof is received within ninety (90) days from January 15, 1957.

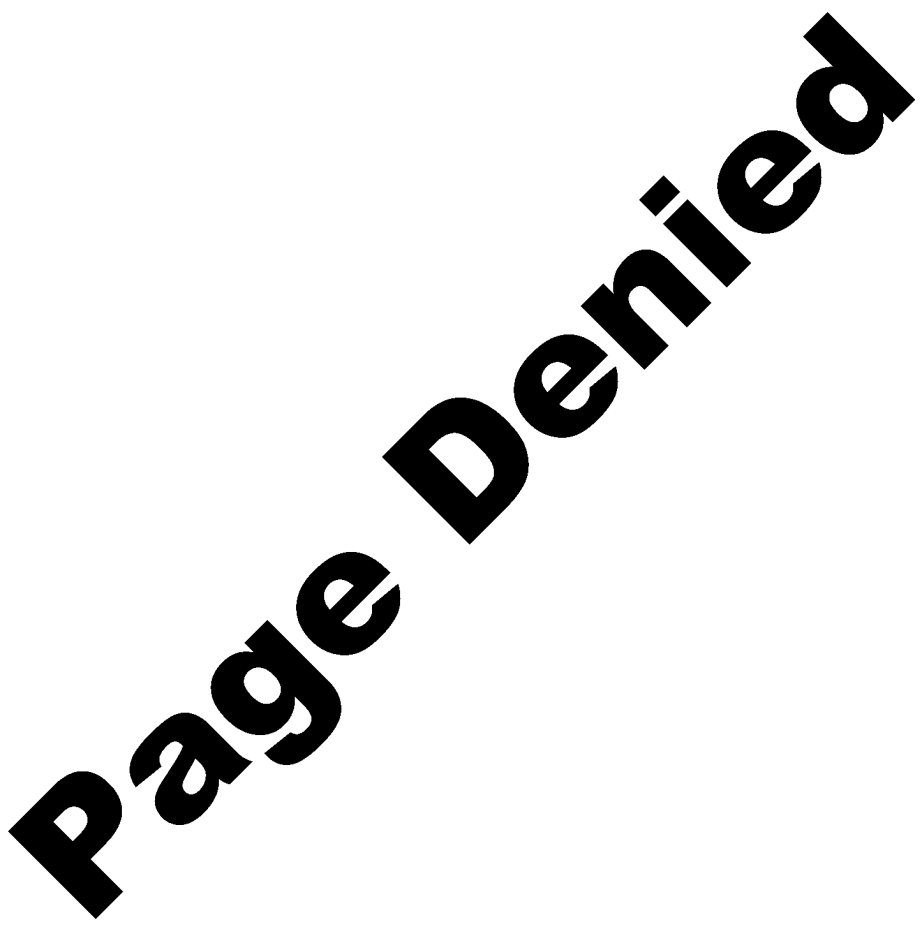
2. All subject matter submitted with this proposal is incorporated herein for study on a confidential basis for the sole purpose of possible contractual negotiations.

3. Overhead and G & A figures used in this proposal are estimated by Certified Public Accountants. These rates are estimated over the fractional year of [redacted] 25X1
It is requested that these figures be allowed until rates may be submitted to the [redacted] for approval. 25X1

C. General Information. 25X1

The following information is provided to supplement information contained in the discussion of terms and conditions.

[redacted]



II. Technical Discussion

A. Introduction

Pressurized balloons are not new to the scientific field, although no free balloons in use today employ the pressurization principle to control the floating altitude of the vehicle.

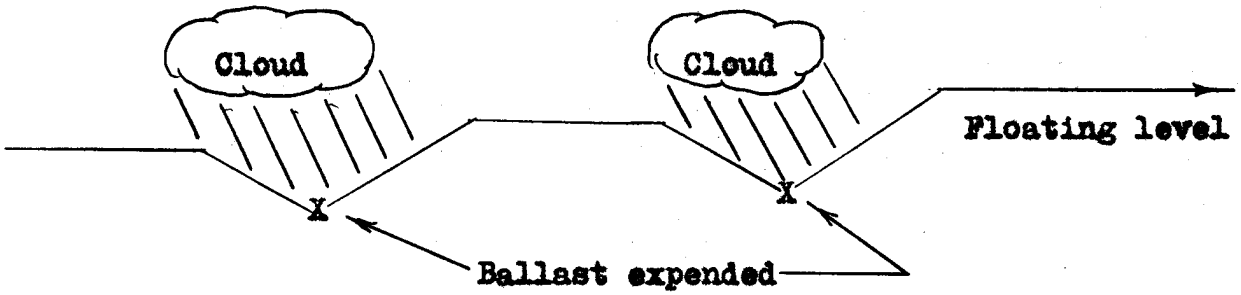
Research balloons flown in the stratosphere currently employ a ballasting system to effect a weight reduction as a means of providing a constant floating altitude. This is necessary because of the loss of lifting gas by diffusion through the skin of the balloon envelope and the loss of lift due to cooling and contraction of the lifting gas at sunset when the heat of the sun is lost.

During World War II, the Japanese Army employed two types of balloon systems in their effort to conduct incendiary warfare against the continental United States. Most of their balloon systems (known as type A) utilized a balloon vehicle which was ballasted, constant level, non-pressurized and manufactured from an enexpensive non-extensible film. The other system (known as type B) was of the pressurized type and flown in very limited quantity. The unavailability of the expensive, treated, silk, fabric used in the balloon envelope, together with the lack of performance data forced a cancellation of their pressurized balloon program. Since that time, it has been learned that their pressurized balloons operated with a high success ratio.

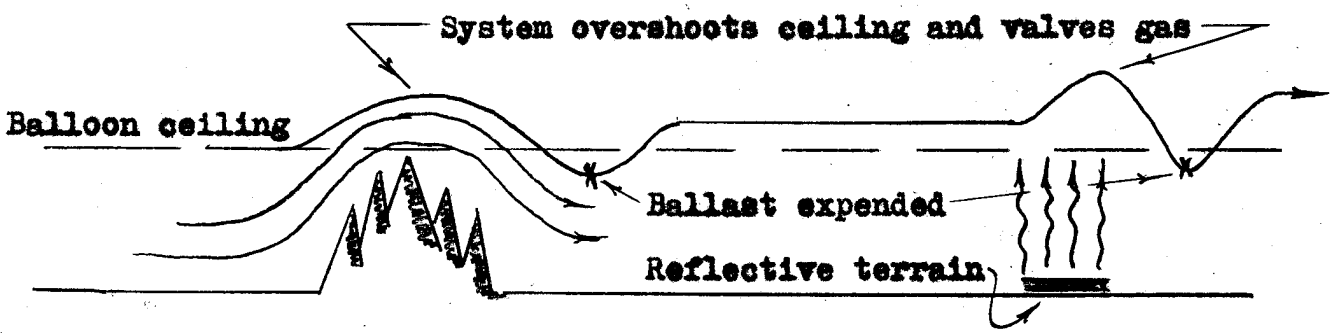
The program outlined herein is in no way suggested to replace the non-pressurized free balloons in use today. It is a means of accomplishing many feats which are impossible to perform using existing methods of ballooning. The pressurized balloon will be

limited in its uses and much more expensive than the non-pressurized vehicles.

Many research groups desire constant level flights to be conducted in the troposphere. Present methods render the possibility of providing a lengthy type of low level day flight very difficult, if not impossible, to attain. As the balloon passes under a cloud formation the lifting gas cools, contracts and a loss of lift is experienced. The balloon begins to descend and ballast must be jettisoned to halt the downward motion. When the cloud cover has passed, the lifting gas again becomes expanded by solar heating and an increase in floating altitude is experienced. Each time ballast is expended, the total weight of the system is lessened and a higher floating altitude ensues. See sketch:



An oscillating floating level also results from the distortion of an air mass flowing over rough terrain and by convection currents rising from reflective areas on the earth's surface. See sketch:



In the process of attempting to correct the oscillations described

above, the balloon system must expend ballast and the flight must be prematurely terminated.

B. Proposed program.

The research program which is herein proposed will include:

1. A period of thorough investigation of past experimentation in the field of pressurized balloons.
2. An examination of new types of synthetic fabric materials with a high strength to weight ratio.
3. Design, construction and test of laboratory model balloons for analysis and study.
4. Design, construction and development of control instrumentation and accessories.
5. Design, construction and flight test of a personnel carrying pressurized balloon, to obtain performance control data.
6. Examination and study of information obtained from first experimental flight. Rework of prototype balloon and controls as required.
7. Second test flight of manned balloon, of extended duration and with maximum flight control exercises.
8. Examination and study of information obtained from second experimental test flight.
9. Rework of vehicle and controls if required. Further flight testing if deemed necessary to further improve the system.
10. Design and manufacture of a complete pressurized balloon system to be flown unmanned.
11. Conduct a flight test of the prototype unmanned balloon.
12. Evaluation of the performance data of the unmanned system.

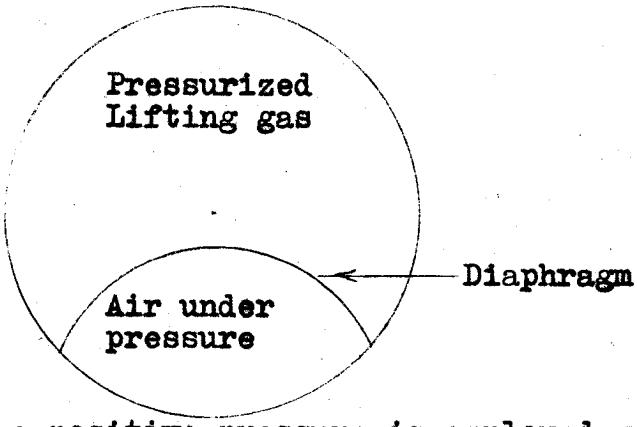
13. Rework of the instrumentation, controls and vehicle, as required for the next experimental flight.

14. Second test flight of the unmanned system, to be of a longer duration and instrumented to float at various levels by command or predetermined arrangement.

15. Review of all activities and results accomplished in the preceding experiments. Analysis of data collected and preparation of a final, technical report of the completed program.

C. New Concepts

In the past, and in today's lighter-than-air vehicles (powered), it is the procedure to utilize an internal diaphragm as a separator within the balloon envelope. Air is added or removed on one side of this flexible diaphragm so as to control the pressure of the lifting gas within the balloon envelope. See following sketch:

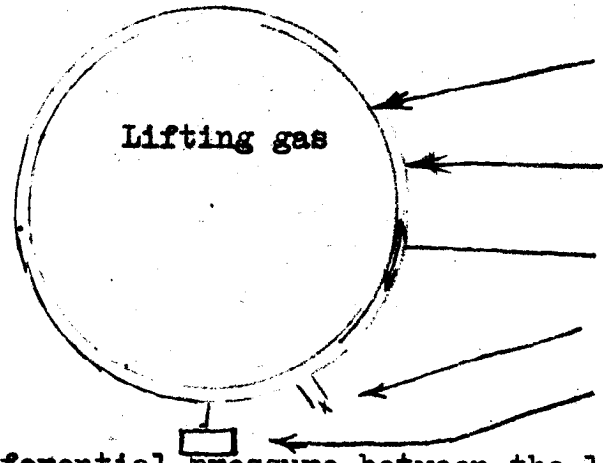


When a positive pressure is employed within the balloon, the lifting gas exerts a pressure against the skin of the envelope, thereby creating an abnormal leakage rate through minute holes in the material.

In this proposed program, a new system of pressurization will be

examined, and adopted if found feasible.

By containing the lifting gas within a thin plastic envelope and enclosing the entire structure within an airtight fabric film balloon, an entirely new concept of pressurization ensues. Note following sketch:



The differential pressure between the lifting gas and the surrounding air has been reduced to the head pressure column of the lifting gas. It is now equivalent to that of a non-pressurized balloon. The loss of lift due to leakage is thus reduced to a minimum in this type of system.

D. Expected Results

If this type of pressurized balloon flight were conducted in an unstable tropspheric atmosphere, the oscillations induced by temperature changes and air mass movements would be counteracted by increasing or decreasing the internal lifting gas supply volume as required for lift correction. No weight loss will be encountered and extremely long duration flights will be made possible.

A pressurized balloon system can be flown so as to make any number of climbs to ceiling and descents to earth without loss of lifting

gas or ballasted weight.

The system can be made to float at any desirable level selected between its ceiling altitude and the earths surface. The floating level can be changed by radio command or other means so as to select a desirable altitude for examination of various wind velocities and directional flows.

E. Time and Cost Schedules

The overhead and labor rates given in "Information for [redacted] 25X1 and Contracting Officers" are used in estimating the cost of [redacted] 25X1 the proposed program. They are subject to change, after a Government Auditor has reviewed our accounts.

In estimating the amount of time required and the expenses involved, reference is made to the phases of the program given in Part B of the Technical Section of this proposal.

The following table will give an estimation of requirements for each phase.

F. Government Furnished Equipment CONFIDENTIAL

In making this proposal it has been assumed that the following items would be made available at no cost to the contractor.

1. Radio frequencies for controls and telemeters used on the balloon program.
2. Helium.

Approximately 100,000 cubic feet of helium, delivered, will be needed. In tank cars, this will cost approximately $2500.00. If this amount is added to the contract costs, no G & A or profit will be taken on this item.